## REMARKS

This amendment is submitted in a good faith attempt to advance the prosecution of the subject application and to consolidate the issues for appeal. Entry thereof is respectfully requested. Claim 1 has been amended to specify that the hair styling polymer comprises a vinylic polymer. See for example, page 3, lines 12 to 20.

It is respectfully submitted that "styling polymer" is a term that is well understood in the art related to hair styling products. See, for example, Cosmetic Science and Technology Series, Volume 17, Hair and Hair Care, edited by Dale H. Johnson, Marcel Dekker, Inc. (1997) at page 368 (index entry for styling aid(s), polymer) and pages 108-110. Additionally, pages 3 to 8 of the subject application provide numerous examples of the materials that may be used as styling polymers in the claimed compositions. It is respectfully submitted that the term is sufficiently well described in the application and understood in the art to moot the challenge thereto under 35 U.S.C.§112. Moreover, as noted above, claim 1 has been amended to further describe the styling polymer as comprising a vinylic polymer. Accordingly, this rejection of the claims is traversed and reconsideration thereof is respectfully requested.

The pending claims stand rejected as anticipated by Cho (US5366665); additionally, such claims also stand rejected as anticipated by Sakuta (US 6,984,390). These rejections are respectfully traversed.

Pursuant to the subject invention it was found that the inclusion of 2-hydroxyalkanoic acid in a leave-on styling product comprising 0.1 to 6% of a styling

polymer improves the composition's high humidity retention properties. Leave-on styling products include, for example, hair sprays, tonics, gels, styling creams and mousses.

Cho is directed to personal product compositions the include an alkyl sulfooxy alkanoate compound of the formula:

$$MO\text{-}S(O)(O)\text{-}O\text{-}CH_2(R_2)\text{-}(CR'2)_n\text{-}C(O)\text{-}OR_1$$

as therein more particularly described. To the extent that 2-hydroxyalkanoic acid is disclosed (as, for example, in Example 7), it **is as a starting material in the production of the described sulfooxy alkanoate compounds**. In Example 7 of Cho, 20.0g of 2-hydroxyoctanoic acid is mixed with 79.0g of decyl alcohol and 624 mg of sulphuric acid. The mixture was heated to 140°C and water was collected as the reaction proceeded. The acid was neutralized by washing with sodium bicarbonate solution and the organic layer was collected and dried over magnesium sulphated. Excess decyl alcohol was removed by high vacuum distillation. The resulting product (decyl 2-hydroxyoctanoate) was used to prepare 2-sulfooxyoctanoate (see example 8). Thus, in Cho the 2-hydroxyoctanoic acid is a raw material used to prepare the sulfooxyalkanoate that is employed as a surfactant in the Cho compositions. There is nothing in Cho that discloses or suggests the use of 2-hydroxyalkanoic acid as an ingredient, let alone as an ingredient in a leave-on styling product that includes a vinylic styling polymer.

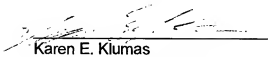
Sakuta et al. is directed to cosmetic materials that contain a sterol-modified silicone as therein more particularly described. To the extent that 2-hydroxy alkanoic acids are disclosed, it is as an additional component in two very specific formulations, i.e., a transparent gel cosmetic (Example 21) or a sunscreen toilet water (Example 22). Neither of these Examples includes a vinylic styling polymer as

required by the subject claims. There is nothing in Sakuta et al. that discloses or suggests the combination of 2-hydroxyalkanoic acid and a styling polymer as described by the subject claims, nor is there any disclosure of the benefits of such a combination in terms of providing a composition with improved high humidity hold or in a method of styling hair as in instant claim 7.

In view of the above described amendments and remarks, reconsideration and allowance of the subject claims is respectfully requested.

If a telephone conversation would be of assistance in advancing the prosecution of the present application, applicants' undersigned attorney invites the Examiner to telephone at the number provided.

Respectfully submitted,



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# Hair and Hair Care

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hold a curled shape until the humidity rises too far or the hair is wetted. It is the job of the styling product (mostly the resin/polymer) to retard the effects of the changing humidity. The styling product will help hold the style longer and support the style (perhaps a hair spray is used to do this). The same is true when curly hair is wetted and then reshaped into a straight fashion—the hair will stay straight until the humidity rises when the hair will revert to the natural permanent curly state.

In today's changing market, the styling product is sometimes relied on to perform the entire job of maintaining the style. In some soft, flowable, and touchable hair styles that may be shampooed and restyled daily, styling aids are thus used alone without the aid of a spray to hold the hair in place.

Although the Tg and stiffness of a polymer or formulation are important, interfibril interaction is the most important factor in styling the hair. High humidity curl retention and degree of tackiness (ranging from slightly tacky to the touch through very sticky—i.e., feels like glue in the hands and the hair sticks to the hand) are particularly important when no hair spray is to be used on the top of the styling product. Volume and control through interfibril interactions without excessive tack are the keys during building the hair style.

The hair needs to be placed into the desired position and set into the curl pattern (or straightened). The tools are applied (comb, dryer, curling iron) to separate the hair or place the hair in the desired positions, seize the hair in place, and perhaps move the hair again, etc., all without pulling or distorting the hair or allowing either tool or hands to inadvertently stick to a section and pull it away, which would destroy the style.

Before beginning to formulate a styling aid, the formulator needs to ascertain what kind of hair the product is intended for, what styling techniques may be used, and what the final hair the styles may be. If it is determined how the consumer will measure the efficacy or difference between a new and an old product, the formulator can develop similar lab test methods and salon tests to simulate the same evaluations the consumer would use at home. Skeletal formulas for some of the product types listed above follow.

Liquids, lotions, working sprays, curl activators, and shaping sprays can all be very low in viscosity—i.e., 5 to 1000 cps. They can be applied from a squeeze bottle, vial, or spray pump directly onto the hair, and then dried to create the desired or needed effect. The concentration of the polymers and ancillary ingredients will depend on the desired final feel on the hair, the styling technique to be used (wet set vs. blow dry, etc.), and the amount of product to be applied (0.5 to 18.0 g).

The viscosity of each of these types is usually determined by the polymers, solutions, or emulsion formulations; no rheological additives are used. They are simply solutions or emulsions that are watery or alcohol thin up to low-viscosity products that give none to slight adhesion between hairs during the wet styling



stage (the hairs do not clump or hold together or hold hair in a particular shape). The stiffness, curl retention, and flaking will depend primarily on the resin/polymer used. The polymer film is then modified (usually plasticized and softened) by the ancillary ingredients, including the fragrance and solubilizer.

The basic historical and current framework for these products is built around PVP, PVP/VA, PVP/dimethylaminoethyl methacrylate copolymers, polyquaternium numbers 4, 11, 28, PVP/vinyl caprylactam/dimethylaminoethyl methacrylate terpolymers, and an assortment of other polymers including proteins plus all the excipients such as solubilizers, emulsifiers, antistats (alkyl quats), glycols, and concept (active) ingredients. The level of each of the ingredients will determine if the product will be stiff, soft, sticky, flexible, clear, or flaky.

For example, PVP (polyvinylpyrrolidone) polymers are very crispy in arid conditions. (PVP's stiffness is related to its molecular weight; i.e., a K-value of 90 is stiffer gram per gram than a K-value of 30) (4) but softer when exposed to high humidity. It is easy to plasticize the dried resin film by adding humectants to the formulation such as polyols, salts, or other hydrogen bonding molecules such as ethoxylates (i.e., ethoxylated fatty alcohols used for solubilizers). As the product dries and the film concentrates, perhaps over 10- or 20-fold, any ingredient at 0.5% or even less can dramatically affect the attributes of the film and resin. Any ingredient that absorbs moisture or remains as a liquid in the dried film will make the film more flexible and reduce flaking. The fatty type (either nonionic or cationic) products may add a smoother feel or "hand" to the hair and reduce static. Usually, combinations of the above are used to add smoothness, flexibility, body, and feel to a hair styling product.

For the polymer to be effective, it must be able to adhere to the hair. If the adhesion to the hair isn't adequate, flaking will result. This can be seen either on the comb or brush, on the hair itself, or on the clothes. If the polymer is highly plasticized, the polymer film will be soft (perhaps even tacky). Some degree of tack is usually desirable to indicate successful styling and body building. In the future, the consumer (and professional) will actually accept styling products with little or no tack time during the dry-down stage of a styling product.

Generally, a styling product may not be tacky at all in the "as is" state. The water or solvent content in the formula is high enough to prevent any adhesive properties at the onset of application. However, as the water (or solvent) begins to evaporate, the concentration of the resin (and ancillary ingredients) rises, the viscosity increases, and tackiness develops. Depending on the properties of solvent, resin, and resin modifiers (ancillary ingredients) at the varying reduced levels of solvent during the drying stages, the tack can last a short time and have low amplitude (gram force—measured by pinching the fingers together followed by separating the fingers and making an assessment of how hard it is to pull the fingers apart, or making a fist, squeezing the product in the fold of

the elbow, or using measuring instruments (4); or, it can be sustained for several minutes with very high amplitude (very sticky; high gram force of adhesiveness); or be sustained for several minutes with low amplitude. Formulations can be made to alter the dry-down characteristics in any of these combinations.

As previously mentioned, the hair is affected by moisture in the air as well as liquid water. Polymers and additives are also affected by moisture and water. A good product will be easy to apply to the hair for the targeted styling technique and hair style, be compatible with the desired additives or system, and be able to be removed from the hair in such a manner that buildup and an unnatural or unwanted look and feel won't be produced.

Any hygroscopic material will either keep moisture in/on the fiber/resin longer or attract moisture to the hair/resin. Generally, the higher the moisture level, the softer or more flexible the resin or hair will be. An increase in moisture will cause the hair to revert back to the natural/permanent shape determined by the disulfide bonds, resulting in either a droop of the curl to a straight appearance or curl up from a straightened style (5). In either case, the style that was intended would not be maintained. In addition, too much hygroscopic material may cause the tacky stage to be prolonged to an undesirable length of time (the intensity of the tackiness may also be increased). A slight amount of tackiness is usually expected to indicate to the user that the product is working, but too much tack will cause the hair to stick to the hands or implements to a point of making it difficult to style the hair, or even pulling out hairs.

## III. PROTOTYPE FORMULATIONS

The product shown in Table 1 would be dispensed into the hand or directly on the hair using a bottle with a small orifice or spray (as the molecular weight and concentration of the resin increase, the spray will become coarser or not be sprayable).

The lotion shown in Table 2 would be applied from a bottle with a 1- to 3-mm orifice.

The product shown in Table 3 would typically be dispensed with a spray pump into the hair. However, it could be applied via a squirt bottle or bottle with a dispenser with a 1-mm orifice onto the hands or directly onto the hair. The benefit of distributing the product directly to the hair is that the hands never touch the product. The product can be evenly distributed to all portions or selectively to sections of the hair style merely by spraying a fine mist. Previous methods required applying the solution to the hands followed by distribution of the lotion throughout the hair before drying. The hands would then be rinsed to prevent them from becoming sticky.

The formula shown in Table 4 uses a hair spray resin for styling, for a different feel from the standard setting resin. This format has also been called a spray gel, but it contains no rheological additive.